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Cognitive Flexibiliy and Epistemic Curiosity on Mathematical Learning Agency Among Strengthened Senior High School Curriculum(SSHS) Students

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Abstract: This study examined the relationships of cognitive flexibility and epistemic curiosity with mathematical learning agency among students under the Strengthened Senior High School Curriculum. Specifically, it determined the levels of the three variables, examined their relationships, and identified their individual and combined predictive contributions to mathematical learning agency. A correlational-predictive research design was employed, involving Grade 11 and Grade 12 students from all strands at Quezon Bukidnon Comprehensive National High School, one of the pilot schools implementing the strengthened curriculum in the Division of Bukidnon. Data were collected using adapted and modified questionnaires and analyzed through descriptive statistics, Pearson product-moment correlation, and multiple linear regression. The findings revealed that students demonstrated moderate levels of cognitive flexibility, epistemic curiosity, and mathematical learning agency. Both cognitive flexibility and epistemic curiosity had strong, positive, and statistically significant relationships with mathematical learning agency. Furthermore, the regression analysis showed that both variables significantly and positively predicted mathematical learning agency, with epistemic curiosity demonstrating a stronger predictive contribution than cognitive flexibility. These findings suggest that students' capacity to think flexibly and their desire to pursue knowledge are important predictors of their engagement and agency in mathematical learning. The study suggests that mathematics instruction should provide opportunities for students to explore unfamiliar problems, consider alternative strategies, and take greater responsibility for developing mathematical understanding.

Keywords: *Cognitive Flexibility, Epistemic Curiosity, Mathematical Learning Agency, Mathematics Education, Strengthened Senior High School Curriculum.*

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I. INTRODUCTION

Mathematical learning requires more than the ability to perform procedures and arrive at correct answers; it also involves students' capacity to adjust their thinking, explore unfamiliar ideas, and take an active role in constructing mathematical understanding. As students encounter complex mathematical tasks, cognitive flexibility enables them to generate alternative strategies, shift perspectives, and adapt their approaches to problem-solving (de Santana et al., 2022; Newton et al., 2020). Similarly, epistemic curiosity motivates learners to seek information, resolve gaps in understanding, and engage with intellectual challenges (Tang & Salmela-Aro, 2021). These capacities are relevant to mathematical learning agency, which is expressed through students' participation, independent reasoning, collaboration, and critical engagement in mathematical activities (Hansen, 2022). Although previous studies have examined these constructs in relation to mathematical performance, curiosity, and student participation, understanding how cognitive flexibility and epistemic curiosity jointly relate to and predict mathematical learning agency among Senior High School students remains important, particularly within the implementation of the Strengthened Senior High School Curriculum. This study therefore examined the levels of cognitive flexibility, epistemic curiosity, and mathematical learning agency among Grade 11 and Grade 12 students of Quezon Bukidnon Comprehensive National High School, one of the pilot schools implementing the strengthened curriculum in the Division of Bukidnon. Specifically, it investigated the relationships of cognitive flexibility and epistemic curiosity with mathematical learning agency and determined their individual and combined predictive contributions. By examining these variables together, the study sought to provide evidence on the cognitive and

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motivational factors associated with students' active engagement and agency in mathematics learning.

➢ *Research Questions*

This study aimed to examine the influence of cognitive flexibility and epistemic curiosity to the mathematical learning agency of strengthened senior high school students of Quezon Bukidnon Comprehensive National High School Academic Year 2026-2027.

Specifically, it aimed to address the following questions:

- What is the level of the cognitive flexibility experienced by students in the following domains:

✓ Alternative Strategy Generation;
✓ Perspective Shifting;
✓ Strategy Switching;
✓ Flexible Mathematical Representation;
✓ Adaptive Mathematical Problem Solving; and
✓ Cognitive Control Monitoring?

- What is the level of epistemic curiosity possessed by students in the following areas:

✓ Exploratory Interest;
✓ Information-Gap-Driven Persistence
✓ Intellectual Challenge Orientation
✓ Self-Directed Search; and
✓ Problem-Solving Orientation?

- What is the level of the mathematical learning agency demonstrated by students in the following aspects:

✓ Disciplinary learning;
✓ Conceptual learning;
✓ Collective learning; and
✓ Critical learning?

- Is there a significant relationship between level of Mathematical learning agency possessed by students and:

✓ Cognitive flexibility, and
✓ Epistemic curiosity?

- Which variable, singly or in combination best predicts the level of mathematical learning agency of students?

➢ *Scope and Delimitation*

This study focused on examining the relationships of cognitive flexibility and epistemic curiosity with mathematical learning agency among students under the Strengthened Senior High School Curriculum. Specifically, it examined cognitive flexibility in terms of alternative strategy generation, perspective shifting, strategy switching, flexible mathematical representation, adaptive mathematical problem solving, and cognitive control monitoring. Epistemic curiosity was examined through exploratory interest, information-gap-driven persistence, intellectual challenge orientation, self-directed search, and problem-solving orientation. Meanwhile, mathematical learning agency was assessed in terms of disciplinary learning, conceptual learning, collective learning, and critical learning. The study involved 251 Grade 11 and Grade 12 students from all strands at Quezon Bukidnon Comprehensive National High School, Division of Bukidnon, during Academic Year 2026–2027. Data were gathered using three adapted and modified questionnaires administered through printed and online formats.

The study was delimited to the selected Senior High School students of Quezon Bukidnon Comprehensive National High School; therefore, its findings may not be generalized to students from other schools or educational settings without considering their differences in context. It focused only on cognitive flexibility and epistemic curiosity as predictors of mathematical learning agency and did not include other possible factors that may be associated with students' mathematical learning agency. Furthermore, the study relied on self-reported responses from the adapted and modified questionnaires, which may be influenced by the respondents' understanding of the statements and their willingness to provide accurate answers. Since the study employed a correlational-predictive design, its findings were limited to identifying statistical relationships and predictive contributions and did not establish causal relationships among the variables.

II. LITERATURE REVIEW

➢ *Cognitive Flexibility in Mathematics Learning*

Cognitive flexibility refers to the capacity to adjust thinking and shift between strategies when a task or situation changes. In mathematics, this capacity is reflected in students' ability to generate alternative solutions, recognize relationships among representations, and select strategies that fit the problem. A meta-analysis by de Santana et al. (2022) reported a positive relationship between cognitive flexibility and mathematical performance, suggesting that flexible thinking is relevant to students' success in mathematics. Shaw et al. (2020) likewise examined mathematical flexibility in relation to cognitive and affective factors and emphasized the role of students' awareness that problems may be approached in more than one way. Newton et al. (2020) further explained that mathematical flexibility involves preferences, knowledge, and the use of effective strategies, with prior knowledge shaping how students respond to mathematical tasks.

Classroom practices can provide opportunities for students to develop and demonstrate this flexibility. Durkin et al. (2017) discussed the instructional value of comparing multiple solution strategies, particularly when students are asked to examine similarities, differences, and the efficiency of alternative procedures. Verschaffel (2024) described strategy flexibility as the adaptive use of strategies in mathematical problem solving and noted that the construct has been understood in different ways across the literature. More recently, Lid et al. (2026) proposed a multidimensional framework for mathematical strategy flexibility that includes the use of multiple strategies, selection of an optimal strategy,

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and switching between strategies. Taken together, these studies support examining cognitive flexibility through students' capacity to generate alternatives, shift perspectives, switch strategies, use mathematical representations flexibly, adapt their problem-solving approaches, and monitor their thinking.

➢ *Epistemic Curiosity in Mathematics Learning*

Epistemic curiosity concerns the desire to acquire knowledge and resolve gaps in understanding. Many studies distinguished interest-type curiosity, which is associated with the pleasure of discovering new information, from deprivation-type curiosity, which arises from feeling that something important is not yet understood. This distinction is relevant to mathematics because students may explore a topic out of interest or persist because they want to resolve a specific uncertainty. Tang and Salmela-Aro (2021) examined the prospective role of epistemic curiosity in standardized test performance, connecting students' curiosity with academic outcomes. Yow et al. (2022), in a scoping review, also showed that curiosity has been conceptualized and measured in different ways across psychological research, indicating the need to define clearly which aspects of curiosity are being examined in a particular learning context.

Research linking curiosity with learning and mathematical problem solving provides further support for considering this construct in the present study. Yazici and Kartal (2025) examined epistemic curiosity alongside metacognitive awareness in relation to approaches to learning, suggesting that curiosity should be considered together with how learners monitor and regulate their learning. Wang et al. (2026) investigated intellectual curiosity in relation to adolescents' mathematical problem-solving ability, directly connecting curiosity with mathematical learning. Schumacher et al. (2026) found that intellectual curiosity was associated with more adaptive information-seeking behavior and knowledge-test performance, although the strength of these relationships varied across study contexts. These findings provide a basis for examining epistemic curiosity through exploratory interest, persistence in resolving information gaps, orientation toward intellectual challenge, self-directed information seeking, and problem-solving orientation. They also suggest that curiosity may contribute to learning when students have meaningful opportunities to investigate questions and pursue explanations.

➢ *Mathematical Learning Agency*

Mathematical learning agency refers to students' capacity to participate actively in mathematical learning, make decisions about their work, and contribute to the development of understanding. Researchers examined how classroom activity systems shape students' participation and opportunities to construct competence in mathematics. Their work suggests that agency is connected to the kinds of participation made possible by classroom norms and tasks. Atabaş et al. (2020) compared mathematics lessons with and without interactive simulations and considered how classroom norms shaped opportunities for student agency. Hansen (2022) connected students' agency with creative reasoning and collaboration in mathematical problem solving, indicating that agency can be expressed through students' decisions, reasoning, and interactions as they work on mathematical tasks.

Agency also has an interpersonal and assessment-related dimension. Haataja et al. (2022) examined students' interpersonal behaviors during collaborative mathematical problem solving and considered how agency among group members related to successful problem solving. Cribbs and Utley (2026) developed a mathematical agency scale for students in Grades 5 through 12 and explored dimensions of agency in mathematics learning. Their work is relevant to the present study's consideration of disciplinary, conceptual, collective, and critical learning, although the factor structure identified in their validation should not be assumed to establish the same four dimensions in another context. Nieminen and Hannula (2026) discussed student partnership in mathematics assessment as a way of supporting student agency. Together, these studies provide a basis for examining mathematical learning agency in terms of disciplinary learning, conceptual learning, collective learning, and critical learning, while recognizing that the specific organization and measurement of these dimensions require validation with the target students.

III. METHODOLOGY

➢ *Research Design*

This study employed a correlational-predictive research design to examine the relationships of cognitive flexibility and epistemic curiosity with mathematical learning agency among students under the Strengthened Senior High School Curriculum. The quantitative approach enabled the researcher to gather and analyze numerical data through adapted and modified questionnaires. The nonexperimental design was appropriate because the study examined the variables as they naturally occurred without introducing an intervention or manipulating any of them. The cross-sectional approach involved collecting data at a single period during Academic Year 2026–2027.

Specifically, the correlational component determined whether significant relationships existed between cognitive flexibility and mathematical learning agency, as well as between epistemic curiosity and mathematical learning agency. The predictive component used multiple linear regression to determine whether cognitive flexibility and epistemic curiosity, individually or in combination, significantly predicted mathematical learning agency. The study involved Grade 11 and Grade 12 students from all strands at Quezon Bukidnon Comprehensive National High School. Respondents were selected through simple random sampling, and data were collected using three adapted and modified questionnaires administered in printed and online formats. Descriptive and inferential statistical procedures were employed to address the research questions.

➢ *Sampling Design*

The study employed simple random sampling to select 251 respondents from the population of Grade 11 and Grade

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12 students enrolled across all strands at Quezon Bukidnon Comprehensive National High School during Academic Year 2026–2027. This sampling technique provided each eligible student with an equal chance of being selected as a participant. A sampling frame consisting of the eligible students served as the basis for the random selection to minimize selection bias and ensure that the respondents were selected through a fair and unbiased process.

➢ *Research Locale*

The study was conducted at Quezon Bukidnon Comprehensive National High School (QBCNHS), located in Mibando, Poblacion, Municipality of Quezon, Bukidnon, under the Schools Division of Bukidnon. The school serves students from different barangays within the municipality and offers various academic tracks and strands under the Senior High School program. It is also one of the pilot schools in the Division of Bukidnon implementing the Strengthened Senior High School Curriculum. The school was selected as the research locale because its implementation of the strengthened curriculum provided an appropriate setting for examining the cognitive flexibility, epistemic curiosity, and mathematical learning agency of Grade 11 and Grade 12 students.

➢ *Research Participants*

The participants of the study consisted of 251 Grade 11 and Grade 12 students enrolled in different strands at Quezon Bukidnon Comprehensive National High School during Academic Year 2026–2027. They were selected through simple random sampling to ensure that each eligible student had an equal chance of being included in the study. The participants were drawn from the school's Senior High School population under the Strengthened Senior High School Curriculum.

➢ *Research Instrument*

The study utilized three adapted and modified questionnaires to measure cognitive flexibility, epistemic curiosity, and mathematical learning agency. The Cognitive Flexibility questionnaire was adapted from Aborisade and Fajobi (2025) and consisted of 48 items across six dimensions, with eight items per dimension. The Epistemic Curiosity questionnaire was adapted from Choi (2025) and contained 50 items across five dimensions, with ten items per dimension. Meanwhile, the Mathematical Learning Agency questionnaire was adapted from Cribbs and Utley (2026) and comprised 40 items across four dimensions, with ten items per dimension. The original questionnaires were modified by selecting and limiting the items according to the desired number of indicators under each dimension. All three instruments used a five-point Likert scale: 5 – Strongly Agree, 4 – Agree, 3 – Moderately Agree, 2 – Disagree, and 1 – Strongly Disagree. The instruments were pilot-tested with 30 Senior High School students who were excluded from the actual study, yielding Cronbach's alpha coefficients of 0.940 for cognitive flexibility, 0.971 for epistemic curiosity, and 0.945 for mathematical learning agency, indicating excellent internal consistency.

➢ *Data Gathering Procedure*

The researcher first secured permission from the school head of Quezon Bukidnon Comprehensive National High School before conducting the study. After approval was granted, the 251 respondents were identified through simple random sampling from the Grade 11 and Grade 12 student population across all strands. The purpose of the study was explained to the selected participants, and informed consent was obtained from the respondents, together with parental consent for those below 18 years old. The adapted and modified questionnaires were then administered through printed and online formats. After the administration, the accomplished questionnaires were retrieved, checked for completeness, and organized for data processing. Finally, the responses were encoded, tabulated, and prepared for statistical analysis to address the research questions.

IV. RESULTS AND DISCUSSIONS

➢ *Problem 1*

What is the level of the cognitive flexibility experienced by students in the following domains: a. Alternative Strategy Generation; b. Perspective Shifting; c. Strategy Switching; d. Flexible Mathematical Representation; e. Adaptive Mathematical Problem Solving; and f. Cognitive Control Monitoring?

Table 1 Level of Student's Cognitive Flexibility

Sub-Variables	Mean	Verbal Description	Interpretation
1. Alternative Strategy Generation	3.35	Moderately Agree	Moderately Flexible
2. Perspective Shifting	3.21	Moderately Agree	Moderately Flexible
3. Strategy Switching	3.42	Moderately Agree	Moderately Flexible
4. Flexible Mathematical Representation	3.26	Moderately Agree	Moderately Flexible
5. Adaptive Mathematical Problem-solving	3.35	Moderately Agree	Moderately Flexible
6. Cognitive Control Monitoring	3.49	Moderately Agree	Moderately Flexible
Over-all Mean	**3.35**	**Moderately Agree**	**Moderately Flexible**

The results revealed that students demonstrated a moderate level of cognitive flexibility, as indicated by the overall mean of 3.35, verbally described as Moderately Agree and interpreted as Moderately Flexible. Among the six dimensions, Cognitive Control Monitoring obtained the highest mean (3.49), followed by Strategy Switching (3.42), suggesting that students showed relatively stronger tendencies to monitor their thinking and adjust their mathematical approaches. In contrast, Perspective Shifting obtained the lowest mean (3.21), indicating that considering mathematical problems from different viewpoints may be comparatively less developed. These findings are consistent with de Santana et al. (2022), who established a positive relationship between cognitive flexibility and mathematical

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performance. Similarly, Newton et al. (2020) emphasized the role of prior knowledge and effective strategy use in mathematical flexibility, while Durkin et al. (2017) discussed how comparing multiple solution strategies can support students' flexible mathematical thinking. Lid et al. (2026) further identified generating multiple strategies, selecting appropriate strategies, and switching between strategies as important aspects of mathematical strategy flexibility. Taken together, these findings suggest that although students demonstrated cognitive flexibility in their mathematical learning, opportunities to strengthen perspective shifting and the use of alternative problem-solving strategies may further develop this ability.

- *Problem 2.*

What is the level of epistemic curiosity possessed by students in the following areas: a.) Exploratory Interest; b.) Information-Gap-Driven Persistence; c.) Intellectual Challenge Orientation; d.) Self-Directed Search; and e.) Problem-Solving Orientation?

Table 2 Level of Student's Epistemic Curiosity

Sub-Variables	Mean	Verbal Description	Interpretation
1. Exploratory Interest	3.38	Moderately Agree	Moderately Curious
2. Information-Gap-Driven Persistence	3.68	Agree	Curious
3. Intellectual Challenge Orientation	3.28	Moderately Agree	Moderately Curious
4. Self-Directed Search	3.61	Agree	Curious
5. Problem-Solving Orientation	3.32	Moderately Agree	Moderately Curious
Over-all Mean	**3.45**	**Moderately Agree**	**Moderately Curious**

The results revealed that students demonstrated a moderate level of epistemic curiosity, as indicated by the overall mean of 3.45, verbally described as *Moderately Agree* and interpreted as *Moderately Curious*. Among the five dimensions, Information-Gap-Driven Persistence obtained the highest mean of 3.68, followed by Self-Directed Search with 3.61, both interpreted as *Curious.* This suggests that students were relatively more inclined to persist in understanding unfamiliar mathematical concepts and independently seek information to address gaps in their knowledge. Meanwhile, Intellectual Challenge Orientation obtained the lowest mean of 3.28, indicating that students were comparatively less inclined to engage with mathematically challenging ideas. These findings may be understood in relation to Litman (2008), who distinguished interest-type curiosity, driven by the enjoyment of discovering new information, from deprivation-type curiosity, which motivates individuals to resolve gaps in their knowledge. Similarly, Tang and Salmela-Aro (2021) examined the prospective role of epistemic curiosity in standardized test performance, connecting curiosity with academic outcomes. Yazici and Kartal (2025) also examined epistemic curiosity in relation to metacognitive awareness and approaches to learning, suggesting the relevance of curiosity to students' engagement with their learning processes. More directly, Wang et al. (2026) reported a significant positive relationship between intellectual curiosity and adolescents' mathematical problem-solving ability, while Schumacher et al. (2026) found that curiosity was associated with more adaptive information-seeking behaviors, although its relationship with knowledge attainment varied across study contexts. Taken together, these studies provide support for the role of curiosity in knowledge seeking and mathematical learning. In the present study, the results suggest that students were more inclined to pursue answers to knowledge gaps and search for information independently, while their willingness to engage with intellectually demanding mathematical tasks may require further development.

- *Problem 3*

What is the level of the mathematical learning agency demonstrated by students in the following aspects: a.) Disciplinary learning; b.) Conceptual learning; c.) Collective learning; and d.) Critical learning?

Table 3 Level of Student's Mathematical Learning Agency

Sub-Variables	Mean	Verbal Description	Interpretation
1. Disciplinary Learning	3.25	Moderately Agree	Moderately Agentic
2. Conceptual Learning	3.21	Moderately Agree	Moderately Agentic
3. Collective Learning	3.63	Agree	Agentic
4. Critical Learning	3.34	Moderately Agree	Moderately Agentic
Over-all Mean	**3.36**	**Moderately Agree**	**Moderately Agentic**

The results revealed that students demonstrated a moderate level of mathematical learning agency, as indicated by the overall mean of 3.36, verbally described as *Moderately Agree* and interpreted as *Moderately Agentic*. Among the four dimensions, Collective Learning obtained the highest mean of 3.63, interpreted as *Agentic*, suggesting that students were relatively more engaged in collaborative learning, sharing ideas, and participating in mathematical activities with their peers. In contrast, Conceptual Learning obtained the lowest mean of 3.21, indicating that students were comparatively less engaged in independently developing deeper conceptual understanding of mathematical ideas. These findings may be understood in relation to Gresalfi et al. (2009), who explained that student agency in mathematics is shaped by classroom participation and the opportunities learners have to contribute to mathematical activities. Similarly, Hansen (2022)

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emphasized that mathematical agency is expressed through students' reasoning, collaboration, and contributions to shared problem-solving processes. Haataja et al. (2022) also examined how students' interpersonal behaviors and the distribution of agency within collaborative groups relate to mathematical problem-solving. Furthermore, Cribbs and Utley (2026) developed a mathematical agency scale that recognizes disciplinary, conceptual, collective, and critical aspects of students' engagement in mathematics, although their final validation supported a combined disciplinary-conceptual factor. Taken together, these studies support the view that mathematical learning agency involves students' participation in constructing knowledge, making decisions, and collaborating with others. In the present study, the findings suggest that students were relatively more agentic in collective learning, while their engagement in conceptual learning may need further development through activities that encourage independent reasoning, explanation, and deeper understanding of mathematical concepts.

➢ *Problem 4*

Is there a significant relationship between level of Mathematical learning agency possessed by students and: a. cognitive flexibility, and b. epistemic curiosity?

Table 4 Correlation Analysis of the Variables

Independent Variables Correlated with Mathematical Learning Agency	Correlational Coefficient (r)	p-value
1. Cognitive Flexibility	0.782	<0.001
2. Epistemic Curiosity	0.824	<0.001

The results revealed a strong, positive, and statistically significant relationship between cognitive flexibility and mathematical learning agency ($r = 0.782$), ($p < 0.001$). This indicates that students who demonstrated greater cognitive flexibility also tended to exhibit higher mathematical learning agency. Similarly, epistemic curiosity showed a strong positive and statistically significant relationship with mathematical learning agency ($r = 0.824$), ($p < 0.001$). This suggests that students with greater curiosity and a stronger tendency to seek knowledge, explore unfamiliar concepts, and resolve gaps in understanding also tended to demonstrate higher levels of mathematical learning agency. Comparing the correlation coefficients, epistemic curiosity had a numerically stronger association with mathematical learning agency than cognitive flexibility, although the difference between these correlations was not statistically tested. These findings are supported by de Santana et al. (2022), whose meta-analysis established a positive relationship between cognitive flexibility and mathematical performance, suggesting that the ability to shift strategies is relevant to mathematical learning. Likewise, Wang et al. (2026) found significant positive relationships between intellectual curiosity and adolescents' mathematical problem-solving ability, supporting the connection between curiosity and active engagement with mathematical challenges. Hansen (2022) and Haataja et al. (2022) discussed how students' reasoning, collaboration, and interpersonal participation contribute to agency during mathematical problem-solving. These findings provide theoretical and empirical support for the observed relationships.

➢ *Problem 5*

Which variable, singly or in combination best predicts the level of mathematical learning agency of students?

Table 5 Multiple Linear Regression Analysis of Cognitive Flexibility and Epistemic Curiosity as Predictors of Mathematical Learning Agency

Predictors	B	Std. Error	Beta (β)	t	Sig.
1. Constant	0.287	0.125	—	2.296	0.022
Cognitive Flexibility	0.388	0.059	0.354	6.599	<0.001
Epistemic Curiosity	0.513	0.050	0.546	10.173	<0.001
R=0.852	**R squared=0.726**	**F=329.217**			**Sig: <0.001**

The results of the multiple linear regression analysis revealed that cognitive flexibility and epistemic curiosity jointly and significantly predicted students' mathematical learning agency, as indicated by the multiple correlation coefficient of 0.852 and coefficient of determination (R^2) of 0.726. This means that the two independent variables collectively explained 72.6% of the variance in mathematical learning agency, while the remaining 27.4% could be attributed to other factors not included in the model. The overall regression model was statistically significant, F(2, 248) = 329.217, p less than .001, indicating that cognitive flexibility and epistemic curiosity provided a significant combined prediction of mathematical learning agency. These findings are consistent with de Santana et al. (2022), who established a positive relationship between cognitive flexibility and mathematical performance, suggesting that students' ability to adjust their thinking is relevant to mathematics learning. Similarly, Wang et al. (2026) reported a significant relationship between intellectual curiosity and adolescents' mathematical problem-solving ability. These findings suggest that students' capacity to approach mathematical problems flexibly and their willingness to pursue knowledge are relevant to their active participation in mathematical learning.

Further examination of the regression coefficients showed that both cognitive flexibility (β = 0.354, t = 6.599, p less than .001) and epistemic curiosity (β = 0.546, t = 10.173, p less than .001) were significant positive predictors of mathematical learning agency. However, epistemic curiosity emerged as the stronger predictor because it obtained a higher standardized beta coefficient than cognitive flexibility. This indicates that, when the other predictor was held constant, epistemic curiosity made a greater unique contribution to

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predicting mathematical learning agency. Hansen (2022) also associated mathematical agency with students' creative reasoning and collaboration in problem-solving activities, while other research emphasized the role of classroom participation in providing opportunities for students to exercise agency in mathematics. With that, these findings suggest that students' curiosity and flexible thinking are relevant to their capacity to participate actively, make decisions, and engage in mathematical learning. Thus, the null hypothesis stating that cognitive flexibility and epistemic curiosity do not significantly predict mathematical learning agency was rejected.

➢ *Ethical Considerations*

The study observed ethical principles throughout the research process. Permission was secured from the school head before data collection, and the purpose of the study was clearly explained to the selected participants. Informed consent was obtained from the respondents, along with parental consent for those below 18 years old. Participation was voluntary, and respondents' identities and responses were treated with confidentiality. The collected data were used solely for research purposes, with due consideration for the privacy, rights, and welfare of all participants.

V. CONCLUSION

The findings of this study establish that cognitive flexibility and epistemic curiosity are significantly associated with and positively predict mathematical learning agency among students under the Strengthened Senior High School Curriculum. Although students demonstrated moderate levels of these three constructs, their relationships indicate that the ability to approach mathematical problems flexibly and the willingness to pursue knowledge are closely connected to students' active participation in mathematical learning. Notably, epistemic curiosity emerged as the stronger predictor, suggesting that students' desire to explore, seek explanations, and resolve gaps in understanding has a greater unique contribution to predicting their mathematical learning agency when considered alongside cognitive flexibility. These findings suggest that developing mathematical learning agency requires learning experiences that encourage students to think beyond familiar procedures, examine problems from different perspectives, pursue meaningful questions, and take responsibility for their own understanding. Ultimately, mathematics instruction should create opportunities for both flexible thinking and intellectual curiosity so that students can become more active and independent participants in their mathematical learning.

RECOMMENDATION

It is recommended that mathematics teachers design learning activities that develop students' cognitive flexibility and epistemic curiosity while providing meaningful opportunities for them to exercise mathematical learning agency. Classroom instruction should include open-ended and non-routine problems that encourage students to explore alternative solution strategies, shift perspectives, and explain their mathematical reasoning. Teachers should also cultivate curiosity by presenting thought-provoking questions, unfamiliar situations, and opportunities for independent investigation, allowing students to identify gaps in their understanding and seek relevant information. Since collective learning received the highest mean among the dimensions of mathematical learning agency, collaborative tasks may be sustained and strengthened while giving greater attention to conceptual learning, which obtained the lowest mean. School administrators may support these efforts through professional development and the provision of appropriate instructional resources. Future researchers may replicate the study in other schools and educational settings, involve a wider range of participants, and examine additional variables that may contribute to mathematical learning agency. Further studies may also use longitudinal or mixed method approaches to examine how these factors develop and interact over time.

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